REMARKS

Claims 1 and 5 have been amended to more clearly define the evaluation mole ratio, to incorporate the subject matter of claims 3 and 7, respectively, and to correct typographical errors. Additional support for amended claims 1 and 5 can be found on page 14, lines 16-18. Claims 4, 8-10 and 12 have been amended to correct dependencies and/or minor typographical errors. Claims 2, 3, 6, 7 and 11 have been canceled. Upon entry of this amendment, which is respectfully requested, claims 1, 4, 5, 8-10 and 12 will be pending.

Response to Claim Rejection Under § 112

Claims 3 and 7 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite.

As noted, Claims 3 and 7 have been canceled. In addition, Claims 1 and 5 have been amended to incorporate subject matter from Claims 3 and 7 and to more clearly define the evaluation mole ratio. It is respectfully submitted that the amended claims fully comply with 35 U.S.C. § 112, and withdrawal of the rejection is requested.

Response to Claim Rejections Under § 103

(1) Claims 1-2, 4-6 and 10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 7-47108 to Keizo et al in view of JP 1010901 to Yoshimichi et al.

(2) Claims 8-9 and 11-12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Keizo in view of Yoshimichi as applied to claims 1-2, 4-6 and 10 above, and further in view of U.S. Patent Application Publication No. 2002/0127153 to Ganeshan.

Applicants respectfully traverse.

Keizo discloses a method of managing catalyst degradation whereby the NO_x exhaust concentration and the unreacted NH_3 exhaust concentration of each catalyst layer is periodically measured. Thus, the NO_x removal efficiency of each catalyst layer is calculated and catalyst degradation is managed. Keizo fails to disclose or suggest determining the percent NO_x removal (η) on the basis of an inlet mole ratio (i.e., inlet NH_3/inlet NO_x) as presently claimed.

Yoshimichi discloses a method of performance management of a NO_x removal catalyst system suitable for a catalyst denitrogenization plant, wherein the denitrogenization performance at the time of operation is calculated by the following formula:

NO_x removal-efficiency = {(entrance NO_x – exit NO_x) /entrance NO_x} x 100

See, paragraph [0023].

In addition, Yoshimichi discloses that if the mole ratio is calculated from the poured-in amount of NH_3, theory is not suited in many cases. Further, the mole ratio which is more exact is from the exit NH_3 concentration. See, paragraph [0018].

What Keizo and Yoshimichi do not disclose is a means of for determining the percent NO_x removal (η) on the basis of an inlet mole ratio (i.e., inlet NH_3/inlet NO_x) <u>and</u> an evaluation mole ratio, which is a distinctive feature of the claimed invention. This is discussed in detail below.

The present claims relate to a NO_x removal catalyst management unit for managing a plurality of NO_x removal catalyst layers provided in a flue gas NO_x removal apparatus, characterized in that the management unit comprises, *inter alia,* a percent NO_x removal determination means for determining percent NO_x removal (η) on the basis of an inlet mole ratio (i.e., inlet NH_3/inlet NO_x) and an evaluation mole ratio which is predetermined for the purpose of

evaluating respective NO_x removal catalyst layers or a plurality of NO_x catalyst layers, wherein the percent NO_x removal (η) is determined on the basis of the following equation (1):

$$\eta = \{(\text{inlet } NH_3 - \text{outlet } NH_3)/(\text{inlet } NH_3 - \text{outlet } NH_3 + \text{outlet } NO_x)\}\times 100\times(\text{evaluation mole ratio/inlet mole ratio}) \qquad (1)$$

As shown in Fig. 1, below, the reactivity of NO_x (i.e., percent NO_x removal) in a NO_x removal catalyst system varies in response to the mole ratio of the injected reducing agent concentration (namely NH_3 concentration) to the NO_x concentration.

Performance of NO_x removal catalyst (percent NO_x removal vs. mole ratio)

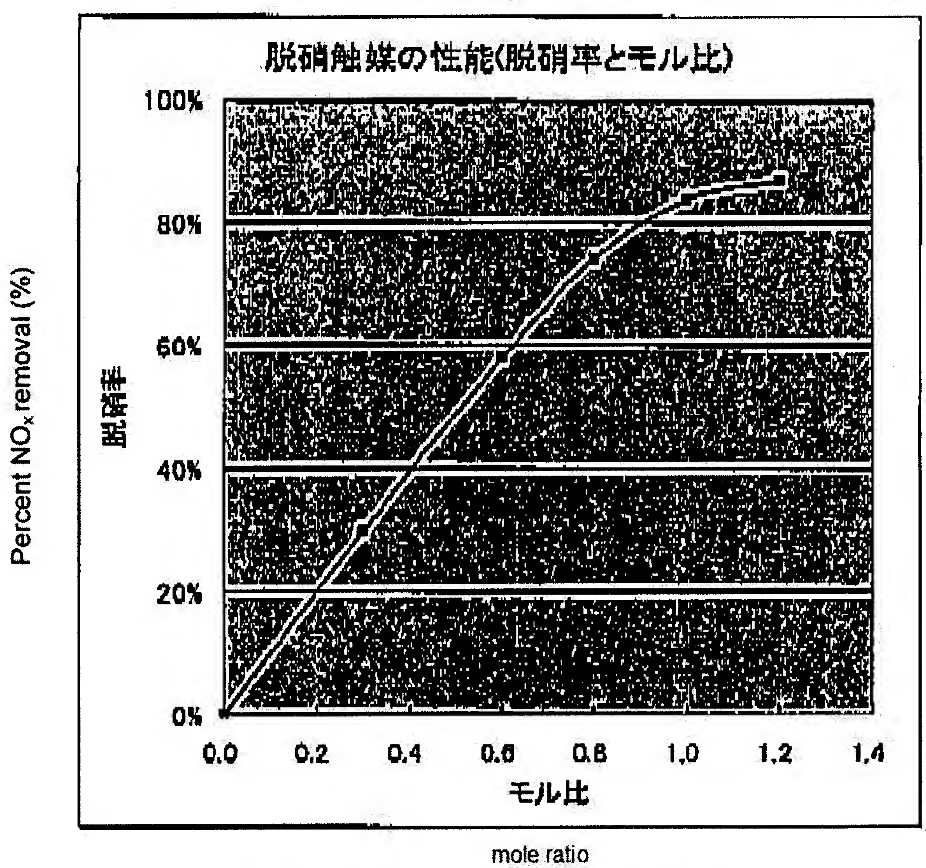

Fig. 1 - % NO_x Removal vs. Mole Ratio

However, NO_x removal units generally have a plurality of NO_x removal catalyst layers, and as shown in Fig. 2, below, the percent NO_x removal of such a multi-layer NO_x removal unit not only varies in response to the mole ratio, but the NO_x removal performance of the multi-layer unit becomes more stoichiometric (i.e., a reactivity of 100%) than that attained by a single-layer NO_x removal catalyst. This effect becomes more significant at a higher mole ratio.

Performance of NO_x removal unit (having a plurality of NO_x catalyst layers)
(percent NO_x removal vs. mole ratio)

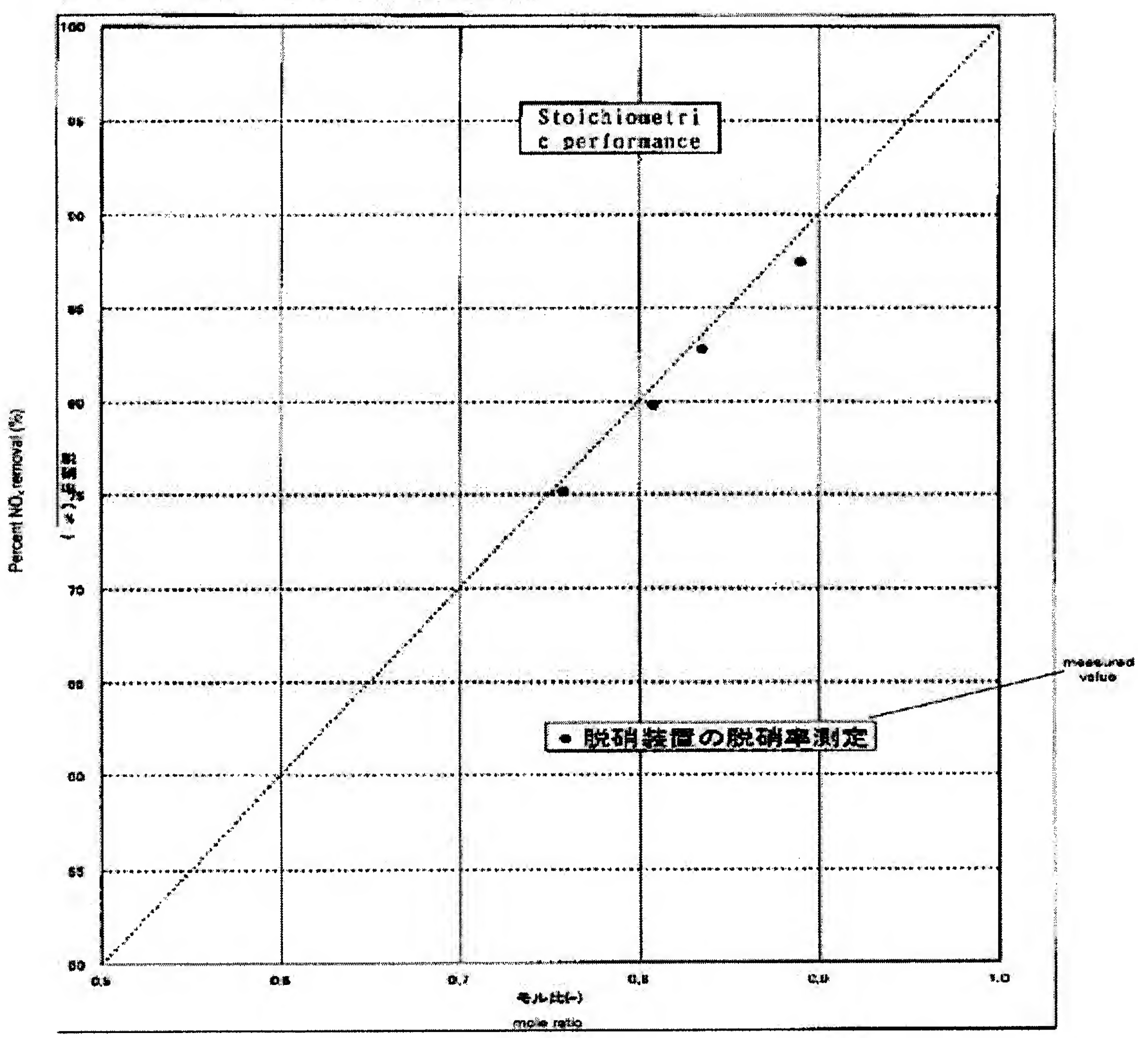

Fig. 2

Fig. 2

Thus, in order to more accurately evaluate the performance of a NO_x removal catalyst layer or that of a NO_x removal unit, having a plurality of NO_x catalyst layers, a predetermined mole ratio, which is generally determined based on the specifications of a NO_x removal unit, is selected, and the NO_x removal performance at the selected mole ratio is evaluated. In other words, if the "evaluation mole ratio" is not employed, performance of a NO_x removal catalyst layer or that of a NO_x removal unit having a plurality of NO_x catalyst layers cannot be accurately evaluated. As such, the "evaluation mole ratio," as presently claimed, is an important factor for accurately evaluating a NO_x removal catalyst layer or a NO_x removal unit.

An exhaust gas having a mole ratio that is equal to a certain evaluation mole ratio is difficult to feed into a NO_x removal catalyst layer or NO_x removal unit for the purpose of evaluating the catalyst layer. Thus, the percent NO_x removal of a NO_x removal catalyst layer or NO_x removal unit has conventionally been determined using an exhaust gas having predetermined inlet mole ratio.

In order to accurately evaluate the NO_x removal performance, the thus obtained percent NO_x removal must be converted to the corresponding percent NO_x removal at the evaluation mole ratio. In other words, the non-converted percent NO_x removal of a NO_x removal catalyst layer can be determined from the left side of presently claimed equation (1). In addition, the right side of equation (1) is required to converting the non-converted percent NO_x removal to a corresponding percent NO_x removal evaluated using an exhaust gas based on the evaluation mole ratio.

Keizo, Yoshimichi and Ganeshan fail to disclose or suggest the presently claimed NO_x removal catalyst management system, and thus, fail to render obvious the present claims. Specifically, none of the cite references disclose or suggest a means for determining the percent

NO_x removal (η) on the basis of an inlet mole ratio (i.e., inlet NH_3/inlet NO_x) and an evaluation mole ratio, which is predetermined for the purpose of evaluating respective NO_x removal catalyst layers or a plurality of NO_x catalyst layers, as presently claimed.

Withdrawal of the foregoing rejections is respectfully requested.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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